

**UTILITY
PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. P99,2498

First Named Inventor or Application Identifier

Thomas Ahrndt et al,

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ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
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APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. Specification [Total Pages 11]
 2. Drawing(s) (35USC 113) [Total Pages 2]
 3. Declaration and Power of Attorney [Total Pages 3]
 a. Newly executed declaration (Original copy)
 b. Copy from prior application (37CFR 1.63(d))
(for continuation/divisional with Box 14 completed)
 i. **[Note Box 4 Below]**
DELETION OF INVENTOR(S)
 Signed statement attached deleting
 Inventor(s) named in the prior application,
 see 37 CFR 1.63(d)(2) and 1.33(b).
 4. Incorporation By Reference (usable if Box 3b is checked)
 The entire disclosure of the prior application, from which a
 copy of the oath or declaration is supplied under Box 3b,
 is considered as being part of the disclosure of the
 accompanying application and is hereby incorporated by
 reference therein.

ACCOMPANYING APPLICATION PARTS

5. Assignment Papers (cover sheet & documentation)
 6. Letter under 37 CFR 1.41(c).
 7. English Translation Document *(if applicable)*
 8. Information Disclosure Statement (IDS)/PTO-1449
 9. Preliminary Amendment
 10. Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
 11. Small Entity Statement(s) Statement filed in prior application,
 Status still proper and desired
 12. Certified Copy of Priority Document(s) German
 Application No. 199 01 756.5 filed January 18, 1999
 13. Other:

14. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

Continuation Divisional Continuation-in-part (CIP) of prior application No: 1

CLAIMS AS FILED

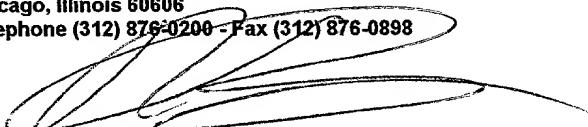
	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) BASIC FEE \$690.00
TOTAL CLAIMS	20	5			
INDEPENDENT CLAIMS	3	2			
	ANY MULTIPLE DEPENDENT CLAIMS? (<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO)				
					TOTAL FILING FEE > <u>\$690.00</u>

The Commissioner is hereby authorized to charge any additional fees which may be required in connection with this application, or credit any overpayment to ACCOUNT NO. 08-2290. A duplicate copy of this sheet is enclosed.

A check in the amount of \$ 690.00 to cover the filing fee is enclosed.

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January 18, 2000

Hon. Assistant Commissioner for Patents
Washington D.C. 20231

Re: Proposed Patent Application for THOMAS AHRNDT, ANKE GERWENS,
KARL KLOPPE and JOHANN NEUMAYER entitled "METHOD FOR
OPERATING DEVICES FOR TRANSMITTING HIGH-BIT-RATE DATA
ON AN EXTENSION LINE AND ARRANGEMENT HAVING SUCH
DEVICES FOR DATA TRANSMISSIONS, Attorney Docket No. P99,2498

SIR:

Under the provisions of 37 CFR § 1.41 (c), I am filing the attached application
with 5 claims, 2 sheets of informal drawings and filing fee on behalf of THOMAS
AHRNDT, ANKE GERWENS, KARL KLOPPE and JOHANN NEUMAYER and request
that the application papers be assigned a serial number and filing date.

I request that the application be assigned a Serial No. and Filing Date pursuant
to the provisions of 37 C.F.R. § 1.53(b) and 37 C.F.R. § 1.53(f).

Respectfully submitted,

Steven H. Noll

Steven H. Noll (Reg. No. 28,982)
Attorney for Applicant

SPECIFICATION

TITLE

“METHOD FOR OPERATING DEVICES FOR TRANSMITTING HIGH-BIT-RATE DATA ON AN EXTENSION LINE AND ARRANGEMENT HAVING SUCH DEVICES FOR DATA TRANSMISSION”

BACKGROUND OF THE INVENTION

The present invention relates to a method for operating devices for transmitting high-bit-rate data on a subscriber line connecting a subscriber terminal device and a telephone exchange on which voice information and low-bit-rate data can also be transmitted. The method is implemented in the course of data transmission connections leading to a data communication network that bypass the central parts of the telephone exchange, whereby there can be a permanent connection between the devices at the subscriber side and at the network side and an access device of the data transmission network.

The present invention also relates to an arrangement having such devices for transmitting high-bit-rate data on a line.

Data transmission on subscriber lines that connect subscriber terminal devices to a telephone exchange, that serve primarily for transmitting voice signals and low-bit-rate data, and that are realized in the form of twisted pair copper wiring, plays a significant role because it would be very cost-intensive to lay separate subscriber lines to terminal devices which comprise other devices for generating and receiving data besides telephone devices, such as personal computers (PCs) and TV devices, and on the other hand, because of the available bandwidth, the existing copper cable network is poorly utilized by the telephone traffic alone. The history of what is known as copper access technology, that is, technology for digital transmission on copper cables, began with the now customary modems (modulator/demodulator). Modems which operate in the voice frequency range achieve transmission rates of up to 56 Kbit/s via existing telephone lines and have meanwhile almost reached the theoretically maximum transmission rates in the

frequency region they use. Such modems transmit and receive in the same frequency region and were made possible only by great advances in digital signal processing, semiconductor technology and in the underlying algorithms.

These conventional modem connections do not meet the demand for a capability to transmit large data volumes such as are involved in connection with the aforementioned terminal devices, and furthermore, they do not provide a uniform transmission of voice and data via the subscriber line.

Some assistance is found in what is known as xDSL technology, whereby DSL stands for Digital Subscriber Line. In this technology, the copper line is divided into three different channels by inserting xDSL modems. One of these channels is still available for conventional telephone service, that is, for voice transmission (POTS: Plain Old Telephone Service). A second channel is made available for connecting the user to the service provider, and a third channel serves to transmit data from the service provider back to the customer. What are known as POTS splitters are typically used on the subscriber side and on the network side of the subscriber line in order to separate the voice channel from the data channels.

What is known as ADSL technology (Asymmetric Digital Subscriber Line) is a popular representative of xDSL technology, this designating a technology that allows the transmission of a high-bit-rate bit stream from a central office to the subscriber and the transmission of a low-rate stream that runs from the subscriber to the central office. Because of this asymmetric transmission technology with respect to bit rate, an ADSL system is suited to such services as video on demand. But ADSL is also particularly suitable for Internet applications, where the bit stream from the central office to the subscriber (downstream) is likewise typically of a significantly higher rate than the upstream bit stream, which primarily serves for transmitting control information relating to the selecting and requesting of data.

In contemporary ADSL technology, the transmission rate of the upstream channel typically varies between 16 Kbit/s and 640 Kbit/s, and the transmission rate of the downstream channel typically varies between 2,048 Mbit/s and 9.6 Mbit/s (depending, for example, on the type and length of cable).

Such high-bit-rate data transmissions are no longer handled completely via

the telephone network, as is the case in the conventional modem connections described above; rather, they are branched onto a data transmission network so as to avoid the central parts of the telephone exchange. To this end, permanent connections are set up between the corresponding data transmission means at the subscriber side and at the network side and an access device to the data network. This means that the devices that terminate the extension line are in permanent operation even outside the context of data transmissions, so that excess operating current is made available, leading to unnecessary heat. This is a significant disadvantage, since there are a number of such devices in the service area of telephone exchanges that are unified in part into one assembly that combines the connection of several subscriber lines.

SUMMARY OF THE INVENTION

It is therefore, an object of the present invention to provide a method that leads to more favorable relations in this regard.

This object is achieved in accordance with the invention in a method for operating high-bit-rate data transmission devices on a subscriber line connecting a subscriber terminal device and a telephone exchange, wherein voice information and low-bit-rate data can also be transmitted on the subscriber line, and wherein during a transmission of high-bit-rate data, a connection for transmitting the high-bit-rate data bypasses a core region of the telephone exchange and connects to a data transmission network as a permanent connection between a high-bit-rate data transmission device at the subscriber side and a high-bit-rate data transmission device at the telephone exchange side and an access device of the data transmission network. According to the method, in a high-bit rate data transmission device that terminates a subscriber line at a telephone exchange side and in a high-bit-rate data transmission device that terminates the subscriber line at a subscriber side, outside a context of a data transmission, operating only those parts of the high-bit-rate data transmission devices that evaluate a criterion indicating a beginning of a data transmission; and operating remaining parts of the high-bit-rate data transmission devices only when the criterion indicates a beginning of a data transmission.

This object is also achieved in accordance with the invention in an arrangement operating according to the method.

Accordingly, in an embodiment, in the device that terminates the extension circuit at the network side and/or at the subscriber side, outside the context of a data transmission only those parts are ready for operation which serve to watch for the occurrence of a criterion indicating the intention to transmit data; the remaining parts are switched into an operative state only upon the determination of such a criterion.

In an embodiment, given the use of an ADSL system, the signaling tones that respectively occur in the upstream and downstream channels are evaluated as criterion for the intention to transmit data. Accordingly, an already existing signaling is used here, so that no additional outlay is necessary.

In further embodiments of the invention, such criteria are formed either permanently or in defined intervals, whereby it is possible to account for practical requirements.

These and other features of the invention(s) will become clearer with reference to the following detailed description of the presently preferred embodiments and accompanied drawings.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of an arrangement for carrying out the inventive method of the present invention.

Figure 2 shows the frequency spectrum of an ADSL system with DMT transmission.

Figure 3 is a block diagram of the device at the network side for an ADSL data transmission.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

Figure 1 illustrates a telephone exchange VST and a subscriber terminal device TEE that are connected to one another by a subscriber line TL.

As terminal devices of the subscriber terminal device TEE, a telephone POTS and, as an example of a data terminal device, a personal computer PC are depicted.

The subscriber line TL respectively terminates at the subscriber side and at the network side with what is known as a POTS splitter PSP, which comprises a

frequency separating filter that combines or separates the high-bit-rate data signals which are jointly transmitted on the subscriber line and which originate at the PC or are intended for the PC, and the voice signals, which originate at the telephone device or are intended therefor; and that ensures that the high-bit-rate data signals that are transmitted according to the aforementioned ADSL method are not disturbed by the high-frequency portions of the dial impulses that occur in the context of the handling of the telephone traffic.

As can be seen on the side of the telephone exchange VST, information that is transmitted from the subscriber terminal device TEE to the telephone exchange via the subscriber line TL, which is a matter of voice information, is fed to the core of the telephone exchange VSTK and is forwarded from there to a public telephone network PSTN, whereas the data information is fed to a device ADSL-CO and is forwarded from there to a data transmission network, which may be a matter of the Internet. A device ADSL-NT corresponding to the device ADSL-CO is provided on the subscriber side as a component of the subscriber terminal device TEE to which the aforementioned PC is connected.

The devices ADSL-CO and ADSL-NT are actually responsible for the high-bit-rate data transmission on the subscriber line TL, whereby the devices ADSL-NT ensures that the digital information originating at the data terminal device PC is suitably converted into analog signals for transmission in a data transmission channel formed on the subscriber line TL so as to lie over the voice channel or it ensures a suitable reconversion in the direction of transmission leading toward the subscriber terminal device TEE. The device ADSL-CO in the telephone exchange VST must ensure that the data signals coming from the subscriber terminal device TEE are converted again into digital form and that they are suitably packeted if, as indicated, the data transmission network is a matter of the Internet; or the device ADSL-CO must ensure that inverse operations are performed, accordingly, in a transmission from the data network to the subscriber terminal device TEE.

Since, in the transmission of the high-bit-rate data, the core region VSTK of the telephone exchange VST is circumvented and so does not load the telephone network, the connection for transmitting the high-bit-rate data is set up as a

permanent connection between the aforementioned devices ADSL-NT and ADSL-CO and an access device, which is not illustrated, to the data network, for instance the Internet, whereby this access device may also be a component of the telephone exchange VST.

To set up such a permanent connection, a complex protocol must be exchanged during a start-up phase, with which protocol the device ADSL-CO and ADSL-NT are adapted to the respective line characteristics in a training phase and then mutually communicate their respective configuration. This communication also relates to the allowed bit rates for the high-rate-channel and to the method for separating directions of forward and back channels.

The permanent connection remains in constant operation, even when there is no data transmission. As a result, there is a constant power loss in the device ADSL-CO and ADSL-NT, which naturally results in a corresponding heating of these devices and in the environment thereof, which represents an appreciable disadvantage particularly in the device ADSL-CO at the network side.

The present invention provides assistance here in that, in this device ADSL-CO at the network side and/or in the device ADSL-NT at the subscriber side, outside the context of a data transmission, only those parts are operative which serve to watch for criteria indicating the intent to transmit data, and the remaining parts are switched into the operative state only when such a criterion is detected.

Figure 2 depicts the splitting of the frequency band on the subscriber line TL given the use of the ADSL system and in this context given the use of the DMT (Discrete Multi Tone) transmission method that is currently applied in ADSL systems in addition to the CAP method (Carrierless AM/PM).

In the DMT method, a number of carrier signals are used for the data transmission which form lower channels in the region of 0 to 1.1. Mhz. The spectrum from 0 to 4 kHz is reserved for voice signal transmission (POTS). There are 249 channels available for the transmission from the telephone exchange VST to the terminal device TEE (downstream); 25 channels are provided for the transmission in the opposite direction (upstream). The illustration according to Figure 2 presumes the use of an echo compensation, whereby the 25 lowest

channels of the spectrum provided for the high-bit-rate transmission can be exploited for both the upstream traffic and the downstream traffic. Alternatively, a transmission in the frequency divided layer method would also be possible.

Figure 2 further illustrates that a signaling tone PT can occur in both the upstream data stream and in the downstream data stream. The downstream signaling tone has been exploited for purposes of synchronization in the device ADSL-NT.

These signaling tones, particularly the upstream signaling tone, are now exploited as identifiers for the intent to transmit data.

Figure 3, in which a device ADSL-CO is illustrated in greater detail, depicts the subdividing of this device ADSL-CO into two groups of components. In operating states in which data transmission does not occur the components drawn in dotted lines, namely a digital interface DI, a digital signal processor DSP and an analog interface AI, as well as an allocated line driver LT, are switched into a power-down mode in which they are not operative and consume little or no power. Only the signaling tone detector SD that is drawn in solid lines is continuously operative while the line is inactive and monitors the subscriber line for the occurrence of a signaling tone in order to switch said parts DI, DSP, AI and LT between the power-down mode and the mode of full operativeness, accordingly. In this way, despite the existence of a permanent connection, power is consumed in greater amounts only during an actually occurring transmission of data, making it possible to reduce the overall power consumption quite significantly.

The signaling tone detector SD can comprise an adjustable bandpass with selectable parameters (middle frequency, bandwidth, detection threshold) by which it is possible to adapt to different variants for realizing ADSL.

The evaluation of the signaling tone can take place permanently or at defined intervals.

The inventive method can of course be applied to other xDSL methods if an unambiguous signaling of the intent to transmit data is provided.

Although modifications and changes may be suggested by those of ordinary skill in the art, it is the intention of the inventors to embody within the patent

warranted hereon all changes and modifications as reasonably and properly come within the scope of their contribution to the art.

WE CLAIM AS OUR INVENTION:

1. A method for operating high-bit-rate data transmission devices on a subscriber line connecting a subscriber terminal device and a telephone exchange, wherein voice information and low-bit-rate data can also be transmitted on the subscriber line, and wherein during a transmission of high-bit-rate data, a connection for transmitting the high-bit-rate data bypasses a core region of the telephone exchange and connects to a data transmission network as a permanent connection between a high-bit-rate data transmission device at the subscriber side and a high-bit-rate data transmission device at the telephone exchange side and an access device of the data transmission network, the method comprising the steps of:

in a high-bit rate data transmission device that terminates a subscriber line at a telephone exchange side and in a high-bit-rate data transmission device that terminates the subscriber line at a subscriber side, outside a context of a data transmission, operating only those parts of the high-bit-rate data transmission devices that evaluate a criterion indicating a beginning of a data transmission; and
operating remaining parts of the high-bit-rate data transmission devices only when the criterion indicates a beginning of a data transmission.

2. The method according to claim 1, further comprising the step of: given use of an xDSL system for high-bit-rate data transmission, evaluating signaling tones that respectively occur in upstream channels and downstream channels as the criterion indicating a beginning of a data transmission.

3. The method according to claim 1, wherein the evaluation of criteria takes place permanently.

4. The method according to claim 1, wherein the evaluation of criteria takes place at definite intervals.

5. An arrangement for transmitting high-bit-rate data on a subscriber line, said subscriber line for transmitting high-bit-rate data, voice information and low-bit-rate data, said arrangement comprising:

a subscriber terminal device having a first high-bit-rate data transmission device connected to a subscriber side of a subscriber line, said first high-bit-rate data transmission device having a number of first parts being operated only during a data transmission and having at least one second part, other than said first parts, being operated outside a context of a data transmission and for evaluating a criterion which indicates a beginning of a data transmission and which is applied for purposes of activating said first high-bit-rate data transmission device;

a telephone exchange having a second high-bit-rate data transmission device connected to a network side of the subscriber line, said second high-bit-rate data transmission device having a number of first parts being operated only during a data transmission and having at least one second part, other than said first parts, being operated outside a context of a data transmission and for evaluating a criterion which indicates a beginning of a data transmission and which is applied for purposes of activating said second high-bit-rate data transmission device; and

an access device for accessing a network connected via permanent connection to said first and second high-bit-rate data transmission devices, said permanent connection for transmitting said high-bit-rate data and bypassing a core region of said telephone exchange.

ABSTRACT OF THE DISCLOSURE

In a method and apparatus for data transmission and voice signal transmission on a subscriber line, in terminal devices located at least on a network side of the subscriber line, only those parts which evaluate a criterion indicating the beginning of the data transmission are switched into active mode outside the context of data transmission.

FIG 1

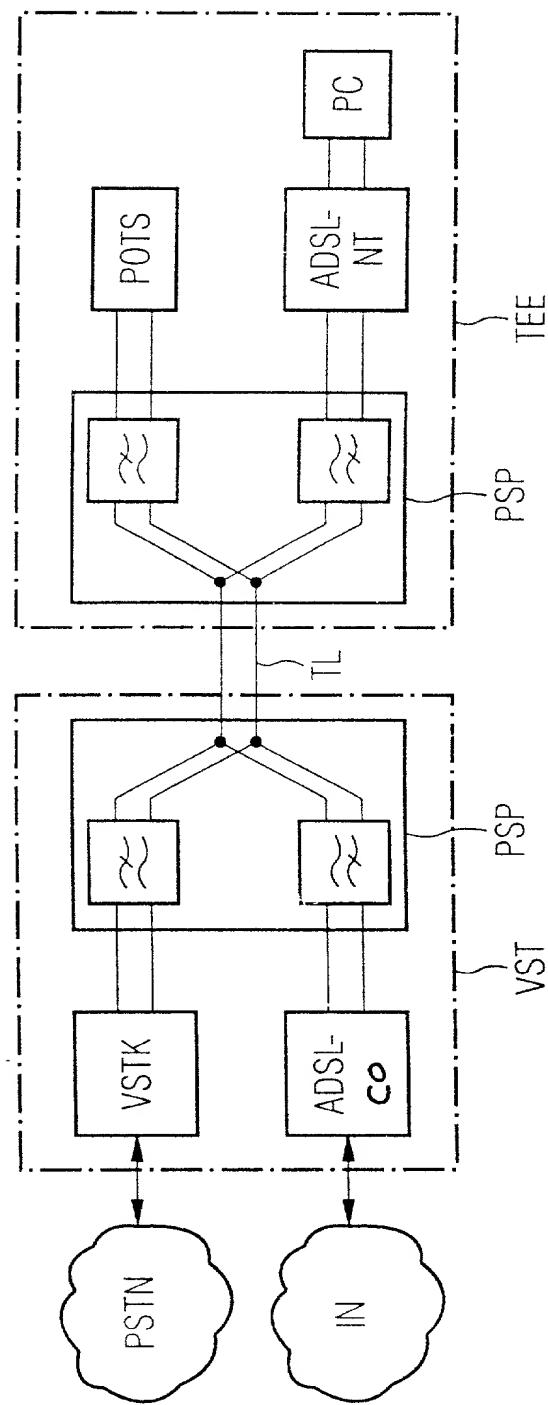


FIG 2

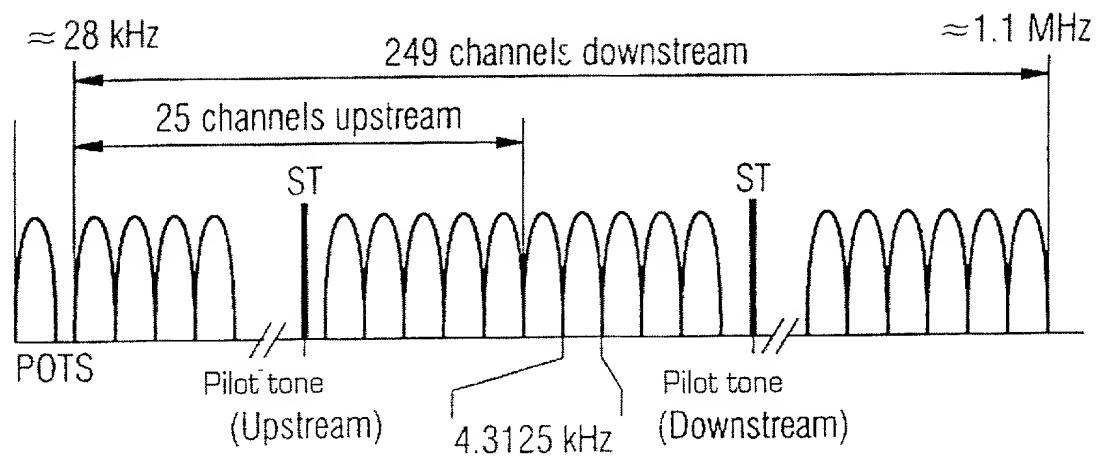
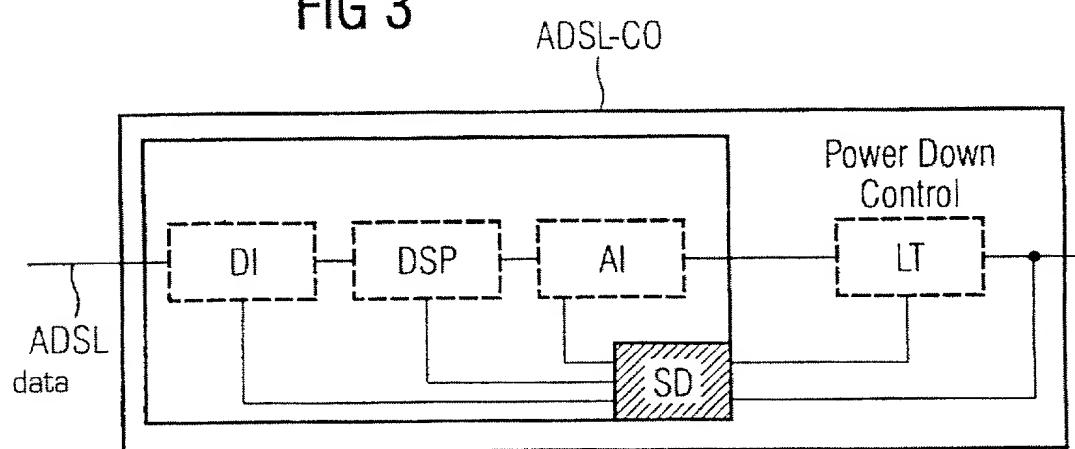


FIG 3



DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

"METHOD FOR OPERATING DEVICES FOR TRANSMITTING HIGH-BIT-RATE DATA ON AN EXTENSION LINE AND ARRANGEMENT HAVING SUCH DEVICES FOR DATA TRANSMISSION"

Case No. P99,2498, the specification of which

(check
one) X is attached hereto.
— was filed on _____, as
Application Serial No. _____
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent Office all information which is known to me to be material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, 1.56.¹

I do not know and do not believe this invention was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and I believe that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as identified below:

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below:

Prior Foreign Application(s)	Number	Country	Date
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19901756.5	Germany	January 18, 1999
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and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the above listed application on which priority is claimed:

Prior Foreign Application(s)	Number	Country	Date
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¹ (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a *prima facie* case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A *prima facie* case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

If no priority is claimed, I have identified all foreign patent applications filed prior to this application:

And I hereby appoint Messrs. John D. Simpson (Registration No. 19,842), Dennis A. Gross (24,410), Robert M. Barrett, (30,142), Steven H. Noll (28,982), Kevin W. Guynn (29,927), Robert M. Ward (26,517), Brett A. Valiquet (27,841), Edward A. Lehman (22,312), David R. Metzger (32,919), Todd S. Parkhurst (26,494), James D. Hobart (24,149), Melvin A. Robinson (31,870), John R. Garrett (27,888), Joseph P. Reagan (35,332), Michael R. Hull (35,902), Michael S. Leonard (37,557), William E. Vaughan (39,056) and Lewis T. Steadman (17,074), all members of the firm of Hill & Simpson, A Professional Corporation

Telephone: 312/876-0200 Ext. 3491

my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and direct that all correspondence be forwarded to:

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85th Floor Sears Tower, Chicago, Illinois 60606

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Full name of fourth joint inventor,

(if any) JOHANN NEUMAYER

Inventor's signature _____ Date _____

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